

**Biomass Research and Development
Technical Advisory Committee**

August 22-23, 2018

Meeting Summary

Table of Contents

TABLE OF CONTENTS	II
LIST OF ACRONYMS	III
I. PURPOSE	1
II. NEW MEMBER ACTIVITIES.....	1
III. WELCOME.....	1
IV. DOE UPDATES AND BIOMASS R&D ACTIVITIES	1
V. USDA UPDATE ON BIOMASS R&D ACTIVITIES	2
VI. BIOMASS RESEARCH AND DEVELOPMENT INTERAGENCY WORKING GROUP UPDATES	3
VII. REALIZING THE CIRCULAR CARBON ECONOMY	4
VIII. PERFORMANCE-ADVANTAGED PRODUCTS FROM BIOMASS	5
IX. OPPORTUNITIES AND CHALLENGES FOR BIOBASED PLASTICS R&D	5
X. PUBLIC COMMENT.....	6
X. DRAFT Q3 MEETING RECOMMENDATIONS.....	7
XI. CLOSING COMMENTS	9
APPENDIX A: COMMITTEE MEMBER ATTENDANCE—AUG. 22–23, 2018.....	1
APPENDIX B: AGENDA—AUG. 22-23, 2017	1

List of Acronyms

AFRI – Agriculture and Food Research Initiative
ARS – Agricultural Research Service
BETO – Bioenergy Technologies Office
BRDI – Biomass Research and Development Initiative
Co-Optima – Co-Optimization of Fuels and Engines
Committee – Biomass Research and Development Technical Advisory Committee
DOE – U.S. Department of Energy
FOA – Funding opportunity announcements
FY – fiscal year
IWG – Interagency Working Group
NIFA – National Institute of Food and Agriculture
NREL – National Renewable Energy Laboratory
OECD – Organisation for Economic Co-operation and Development
R&D – research and development
SBIR – Small Business Innovation Research
USDA – U.S. Department of Agriculture

I. Purpose

On August 22-23, 2018, the Biomass Research and Development (R&D) Technical Advisory Committee (“Committee”) held its first meeting of 2018. The Committee received updates from the U.S. Department of Energy’s (DOE’s) Bioenergy Technologies Office (BETO) and from the U.S. Department of Agriculture (USDA), who delivered a presentation about current USDA activities, with updates regarding forthcoming Biomass Research and Development Initiative (BRDI) selections. The Biomass R&D Interagency Working Groups (IWGs), USDA’s Office of the Chief Scientist, the National Renewable Energy Laboratory, and the Plastics Industry Association also presented. Additionally, the Committee received public comments from Twin Rivers Land & Timber, Inc. and Roselein Alternative Energy.

See Appendix A for a list of meeting attendees and Appendix B for the meeting agenda. Meeting presentations can be viewed on the Biomass R&D Board [website](#).

Background:

The Committee was established by the Biomass Research and Development (R&D) Act of 2000, which was later repealed and replaced by Section 9008 of the Food, Conservation, and Energy Act of 2008. The Biomass R&D Board was established under the same legislation to coordinate activities across federal agencies. The Food, Conservation, and Energy Act has recently been amended by the Agricultural Act of 2014. The Committee is tasked with advising the Secretaries of Energy and Agriculture on the direction of biomass R&D.

II. New Member Activities

Representatives of DOE’s Office of the Chief Human Capital Officer and Office of General Counsel conducted the swearing in of the new Committee members, followed up ethics training for the Committee members.

III. Welcome

Kelly Tiller, Committee Co-Chair

Dr. Tiller welcomed the Committee to the first meeting of the year and called the meeting to order.

Dr. Tiller provided an overview and background of the Committee, including its purpose, authority, make-up, process, audience, and roles and responsibilities. Dr. Tiller then introduced the subcommittee assignments and quarterly topic: bioplastics.

IV. DOE Updates and Biomass R&D Activities

Mark Elless, Designated Federal Officer, DOE

Dr. Elless provided updates on behalf of DOE’s Bioenergy Technologies Office (BETO). Dr. Elless provided information about the Biomass R&D federal Board and Committee, including further detail about the

duties of the Committee and administrative and logistical obligations. Dr. Elless then provided an update on BETO activities since the Committee last met in November 2017.

Since the last meeting, BETO launched the Feedstock-Conversion Interface Forum on Nov. 30, 2017. BETO released several reports between November 2017 and August 2018, including the Engineered Carbon Reduction Listening Day summary report on February 1, 2018, the BETO Program Evaluation Report on February 6, 2018, and on June 28, 2018, the summary report from the Performance-Advantaged Biobased Chemicals workshop.

In addition, BETO also announced launched the Rewiring Initiative, which will seek to identify how low-cost clean power can enable a circular new carbon economy, on February 1, 2018, and released two studies from its Co-Optimization of Engines & Fuels Initiative (Co-Optima) on February 15, 2018.

Further, BETO released multiple Funding Opportunity Announcements (FOAs), as well as the selections from the most recent Biomass R&D Initiative (BRDI) opportunity. On May 2, 2018, BETO announced up to \$12M in funding for Co-Optima. On May 3, 2018, BETO announced up to \$78M in funding for multiple areas of the BETO portfolio. These FOAs focused on BioEnergy Engineering for Products Synthesis, Efficient Carbon Utilization in Algal Systems, Process Development for Advanced Biofuels and Biopower, and Affordable and Sustainable Energy Crops. Finally, on May 9, 2018, BETO announced its BRDI selections, with up to \$3M in funding available. The selections included The University of Tennessee, who will develop an integrated biorefinery design that combines the production of liquid fuels and renewable chemicals to verify production of affordable cellulosic ethanol, and Northwestern University (NU), who will develop a rapid synthesis of next-generation biofuels and bioproducts from lignocellulosic biomass. The project will employ several strategies to reduce the timeframe of discovering biosynthetic pathways to optimize fuel and chemical production, including bottom-up engineering principles, computational models, and cell-free framework systems.

V. USDA Update on Biomass R&D Activities

Daniel Cassidy, National Institute of Food and Agriculture, USDA

Dr. Cassidy provided an update on USDA reporting to the Committee. Dr. Harry Baumes has retired, and Dr. Cassidy is temporarily filling his role. It is yet to be determined who from USDA will assume this position permanently.

Dr. Cassidy provided updates on USDA's bioeconomy research from both the Agricultural Research Service (ARS) and the National Institute of Food and Agriculture (NIFA). For ARS, Dr. Cassidy shared updates about their Biomass Research Centers and their 9003 Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program. For NIFA, Dr. Cassidy provided updates about the Agriculture and Food Research Initiative (AFRI), Small Business Innovation Research (SBIR), and the joint DOE/BRDI solicitations. Dr. Cassidy shared details about existing AFRI participants, as well as two new projects. Dr. Cassidy also shared details about forthcoming USDA BRDI selections (not currently public information).

A committee member asked a question about whether NIFA is relocating outside of the Washington, DC area, and how this might affect the work of the Committee. Dr. Cassidy replied that NIFA is moving, and this will take place by the end of 2019. He indicated that NIFA relies on interactions in the DC area, and for the purposes of BRDI, it is a neutral place. He expressed concern that it will make it more difficult to coordinate with DOE and others in DC, and could negatively affect the optics of BRDI.

A Committee member asked about the status of the Farm Bill. Dr. Cassidy replied that there have been several versions of the Farm Bill, some of which include the Biomass Board, and some that do not. The Senate's most recent version had 9008, but it was renamed and put under a different section. If the Farm Bill is not renewed before it expires in September, the Committee continues to operate as status quo.

A Committee member asked when USDA would officially announce the BRDI selections. Dr. Cassidy stated that this would happen as soon as the Secretary approves them—hopefully this quarter.

VI. Biomass Research and Development Interagency Working Group Updates

Kristen Johnson, Biomass R&D Operations Committee Liaison, DOE

Devinn Lambert, DOE

Jose Costa, USDA

Rob Mitchell, USDA

Alison Goss Eng, DOE

Kristen Johnson, in her capacity as the Operations Committee liaison to the Biomass R&D Board, presented a short update on recent Biomass R&D Board activities. Ms. Johnson provided an update on the Bioeconomy Initiative: Implementation Framework (“Framework,” formerly known as the Bioeconomy Initiative: Action Plan). The Framework is a collaborative document among the Biomass R&D Board member agencies, and will serve as a structure and guide for federal biomass R&D and collaboration between the agencies.

Devinn Lambert, co-chair of the Algae IWG, Jose Costa, co-chair of the Feedstock Genetic Improvement IWG, Rob Mitchell, co-chair of the Feedstock Production and Management IWG, Alison Goss Eng, co-chair of the Feedstock Logistics IWG, David Babson, co-chair of the Conversion IWG, and Ms. Johnson, co-chair of the Sustainable Bioeconomy IWG, all gave short updates on behalf of their IWGs, sharing plans for the year, progress toward their year milestones to date, and plans for the remainder of FY18 and FY19. Ms. Johnson also gave brief updates on behalf of the Analysis and Transportation, Distribution, and End Use IWGs, as their co-chairs were unable to present.

One of the Committee members noted that the largest hurdle faced with regard to feedstocks is how to get biomass feedstocks into the current feedstock supply. Another Committee member asked whether the Implementation Framework had been released yet. Ms. Johnson replied that it is not yet released, but that they are working as quickly as possible to release the Framework.

VII. Realizing the Circular Carbon Economy

David Babson, DOE (on detail to USDA)

Dr. David Babson gave the Committee a presentation on the concept of the circular carbon economy and shared details about a recent Summit, hosted by DOE and USDA, on the topic. The presentation was titled, "Realizing the Circular Carbon Economy: Charting a Course for Innovations in Agriculture and Energy."

Dr. Babson began with background information regarding current global challenges necessitating a sustainable bioeconomy and a renewable/circular carbon economy, including increasing CO₂ in the atmosphere (potentially a cheap and abundant source of carbon), climate change, the growing global population, combined with limited land resources.

Dr. Babson then discussed the concept of the carbon-based economy. Dr. Babson believes that the current economy is a carbon economy; we must switch focus to a renewable carbon economy, engineering systems to use renewable carbon consistently and efficiently, rather than a low carbon economy. In terms of biomass, this involves not just switching feedstocks to carbon sources, but to horizontally integrate recycling carbon into the process. A sustainable economy that can maintain prosperity and address global challenges will be built on carbon, and success is critical. Success will require a massive, coordinated effort.

Dr. Babson then shared the USDA and DOE vision and activities for supporting the circular carbon economy, including the recent *Realizing the Circular Carbon Economy: Innovations in Energy and Agriculture* Summit, hosted by DOE and USDA in Golden, CO on July 24-25, 2018. Additional activities supporting the circular carbon economy include leveraging natural and engineered systems for carbon management, using agroecology, landscape design, precision agriculture, plant breeding and engineering, optimizing systems for efficient utilization of biomass carbon, and new food sources/types/systems, and designing bioplastics that have a circular (rather than linear) life. USDA and DOE have hosted events in addition to the Summit on July 24-25 to engage experts in the circular carbon economy: the Innovations in Vertical Agriculture and Sustainable Urban Ecosystem Engineering meeting on June 26-27, 2018 in Washington, DC, and the Third Annual DOE/USDA Joint Summit on Bioenergy and the Bioeconomy: Fostering Collaboration in Bioeconomy Research in Madison, WI on July 17-18, 2018.

Katrina Cornish asked how USDA will take on the challenge of food loss. Dr. Babson responded that the USDA has a food waste working group and referenced Drawdown. Dr. Cornish clarified that she was referred to food loss, not food waste. Dr. Babson said that USDA is working on strategies to decouple traditional food systems (such as plant engineering, making plants more resistant to the changing environment, better yields, Roundup Ready) and that vertical farming can de-risk food loss and insecurity.

Manuel García Pèrez asked why we are not looking at boilers and biochar, which have great potential but are overlooked? Dr. Babson replied that analysis has been done on biochar/boilers and it is becoming increasingly competitive, but USDA is looking into it. Dr. García Pèrez noted that agencies should be encouraged to move forward with boilers and biochar.

A Committee member asked about the example of the national effort that the US put into building liberty ships in 1941-1945, which Dr. Babson had referenced in his presentation, and asked how to

mobilize the country in a similar way during this time. Dr. Babson replied that this is a subject political leadership to consider.

VIII. Performance-Advantaged Products from Biomass

Mary Bidy, National Renewable Energy Laboratory

Dr. Bidy of NREL gave a presentation titled, “Performance-Advantaged Products from Biomass: State of the Market and Opportunities for Innovative Products.” Dr. Bidy began with information about the motivation for utilizing chemicals from biomass. These factors include the potential market, and support of BETO’s cost goals, in that chemical products co-produced with fuel are often much higher value than the fuel itself. Developing biorefineries that maximize the value of all of the biomass can further drive down costs for biofuels while maximizing fuel yields.

Dr. Bidy shared some information about NREL’s prior report on bio-derived chemicals capable of near-term market impact, as well as drivers for bio-derived products. Dr. Bidy explained what performance-advantaged molecules are, and shared a few examples of these and how they are used in the market. She then shared information about ongoing research, development, and analysis needs in the area of performance-advantaged bioproducts. Mr. Krieger illustrated the differences between biobased and biodegradable plastics, and discussed the potential benefits of biobased plastics. Mr. Krieger then discussed some of the opportunities in bioplastics production, including the global production capacity and current market and production trends. The challenges in bioplastics production were also discussed, including the lack of data (in terms of market data and North American Industry Classification System codes), lack of research investment/federal investment, limited access to sustainable end of life options, and challenges with regard to feedstock access.

IX. Opportunities and Challenges for Biobased Plastics R&D

Patrick Krieger, Plastics Industry Association

Patrick Krieger of the Plastics Industry Association gave a presentation titled, “Opportunities and Challenges for Biobased Plastics R&D.” Mr. Krieger began with background information about the Plastics Industry Association, focusing on the Bioplastics Division, their goals of educating consumers, the plastics industry, and government about bioplastics, advocating on behalf of the industry to regulators and legislators, and collaborating with organizations and companies to promote bioplastics, and their recent activities.

The Committee members asked a number of questions and raised a number of discussion points. A Committee member asked about the current codes and being used for bioplastics. Mr. Krieger noted that some performance standards exist, particularly those being developed in Europe, but that the industry would like better standards around things such as soil and marine biodegradability. The Committee and Mr. Krieger also discussed time to market, noting that time to market from development is often 10-20 years, but in this case, it could potentially be shorter, as fossil-based plastics have built a market already. There was some discussion around the Organisation for Economic Co-operation and Development (OECD) biodegradability tests. A Committee member asked about the how

the plastics industry handles inorganic fillers with regard to these test, to which Mr. Krieger replied that these do not currently “count” because they do not contain carbon, but that standards in Europe are moving toward total bio weight.

There was additional discussion of the challenges surrounding feedstock monocultures, and the need to find a better way to densify at the points of location, storage, and transfer. The room also discussed how to certify biobased methane, and how the content that is in the actual product is the critical point. Additionally, the group discussed methods for increasing public acceptance and awareness of biobased plastics. The group suggested that they might use past recommendation, and also noted that there seems that there may be sufficient market pull for biobased plastics. Mr. Krieger noted that there is a great deal of consumer awareness research from plastics, but that because brands are not able to take on explaining the advantages of biobased plastics to the public, it’s advantageous to have external communications to this effect.

Charles Abbas noted that Archer Daniel Midland had lost a lot of money in biobased plastics, and said that something (level of risk, pricing, markets, etc.) would need to change in order to make this viable.

X. Public Comment

Clay Crosby, Twin Rivers Land & Timber, Inc. and Clean River Global

Clay Crosby, Chief Operating Officer of Clean River Global and CEO of Twin Rivers Land & Timber, Inc., delivered public comment to the Committee. Mr. Crosby has a background in biomass supply research and market development. His company has developed a technology which converts woody biomass from wildfire prevention harvest, disaster relief cleanup operations, and local municipalities’ debris pickup and site prep initiatives to create Nanomass, a carbon neutral coal additive. Nanomass is calorically enhanced wood dust that can blend directly into existing pulverized coal boilers at desired percentage to allow current coal power plants to run at 100% capacity with no modifications necessary. TRG technology has the potential to save thousands of jobs in the coal industry, create jobs and security in America’s timber industry while keeping wood by-products out of local landfills. The process uses feedstocks of 83 to 800 BTU, depending on the material and can use any type of woody biomass with a high moisture content. They have seen interest from Georgia Power. There is potential to use the product in existing coal fired plants, with no capital requirement from the plant. Co-firing biomass with coal would increase the capacity of the existing plants.

Hassan Loutfi, Roselein Alternative Energy

Hassan Loutfi of Roselein Alternative Energy delivered public comment to the Committee. Roselein Alternative Energy is working to restore prairie grasses native to their region on marginal lands, and converting these into biomass feedstocks for conversion into renewable natural gas and sustainable co-products. Roselein believes that prairie grasses are the answer to climate change. They have already established about 1000 acres of prairie grass. Roselein has worked with Iowa State University and Argonne National Laboratory. They seek support from both USDA and DOE. Roselein hope that the

Committee can steer USDA and DOE activities to work with them, and express continued enthusiasm for BRDI. They believe they are the industrial application for the federal government’s R&D activities.

A Committee member asked whether Roselein uses wet or dry anaerobic digestion. Mr. Louffi responded that the prairie grasses are dry, but they are working on wet feedstocks as well.

X. Draft Q3 Meeting Recommendations

Full Committee

Source: Biomass R&D Technical Advisory Committee

Advisory To: Biomass R&D Board

Report Date: August 2018 *

Issue: **Opportunities to Accelerate Growth in Biobased Plastics**



Plastics have become an essential part of modern life and offer great economic, ecologic, and social benefits. While some plastics offer environmental and sustainability benefits (e.g., light-weighting to reduce fuel consumption and highly efficient insulation foams), conventional plastics are derived from non-renewable petroleum resources and often pose challenging end-of-life options. Shifting the raw material base for plastics from petroleum to biobased feedstocks presents an appealing solution for many industries and applications, particularly when the biobased plastics are biodegradable and have potential to be part of a circular economy. The term bioplastics includes plastics derived from biomass feedstocks instead of conventional petroleum feedstocks as well as fossil-derived plastics that are biodegradable. The TAC has identified a sub type of bioplastics, Biobased Plastics, as one category of biobased products with near-term potential to accelerate maturity in the emerging bioeconomy, particularly those biobased plastics with identical property profiles and established recycling systems.

	Durable	Biodegradable
Bio-Based	<ul style="list-style-type: none"> • Bio-Polyethylene • Bio-Polyethylene Terephthalate • Bio-Polyamides • Bio-Polyurethanes 	<ul style="list-style-type: none"> • Polyhydroxyalkanoates • Polylactic Acid • Starch Blends
Fossil-Based	<ul style="list-style-type: none"> • Polyethylene • Polypropylene • Polyvinylchlorie 	<ul style="list-style-type: none"> • Polybutylene adipate terephthalate • Polybutylene succinate • Polycaprolactone

Denotes categories of “bioplastics”, which may be bio-derived or petroleum-derived. Biobased plastics is a further subset of bioplastics including only bioplastics derived from biobased sources.

Biobased plastics can be further categorized in one of three ways: (1) Direct Replacements, where the bio-derived product and its petroleum counterpart are chemically identical (also known as drop-in replacements); (2) Functional Replacements, where the bio-derived product and petroleum-derived products are chemically different but with similar functions and/or properties; or (3) Novel Products, where the bio-derived product is unique from existing petroleum-derived products in structure and/or function, often with performance advantages.

The TAC has identified key technical, market and other hurdles for biobased plastics that are throttling growth, along with specific opportunities to address these challenges through research, development and related efforts.

1 Cost-Competitiveness of Direct Replacements (Drop-Ins)

Today's biobased direct replacement plastics (e.g., bio-PE, bio-PET, etc.) are not cost-competitive with their petroleum-based counterparts.

2 Insufficient Market Pull for Functional Replacements and Novel Chemicals

Biobased functional replacement plastics (PEF, PBS, etc.) currently don't have sufficient market pull to drive investment. Performance-advantaged biobased plastics are a hard sell with consumers (and investors) without extensive education, and require a lot of development compared to drop-ins.

3 Limited R&D

Focused R&D is needed across the value chain, from feedstocks through conversion to integrated product development. Application development has not been a priority of federal funding, i.e., monomer to polymer to material to application to brand. Research and funding needed to build on pioneer biobased plastics efforts reaching commercial production at scale and limited commercial success.

** DRAFT Q3 report, subject to Committee ratification at Q4 Committee meeting.*

Exact replacements for petroleum derived plastics are available today using biobased feedstocks, but at a higher cost. Opportunities exist (near-term and long-term) to move toward cost-competitiveness for drop-in biobased plastics (bio-PE, bio-PET, etc.).

1

Cost
Competitiveness
Opportunity

- ⇒ **Focus R&D on readily available intermediate feedstocks rather than raw biomass; examples of well-characterized intermediate feedstocks further down the chain (in addition to simple sugar) include glycerol, lactic acid, ethanol, lignin**
- ⇒ **Continue to focus on separations technologies, which offer potential to expand the range of suitable feedstocks and reduce costs**
- ⇒ **Encourage and facilitate the use of plant biotechnology for expressing traits directly in plants for increased efficiency**
- ⇒ **Pursue intermediate-level proof of concept to get to drop-in biobased plastics**
- ⇒ **Encourage horizontal integration with existing infrastructure and development of complementary markets to de-risk and improve profitability**

2

A few pioneer efforts have delivered commercial production of biobased plastics at scale and limited commercial success. Focused R&D spanning the value chain—from feedstocks to conversion to integrated product development—can accelerate commercialization. Novel functional replacements and performance-advantaged biobased plastics require extensive development compared to drop-ins.

R&D
Opportunity

- ⇒ **Enable researchers to work backwards from known end-use targets and performance needs; develop and support databases, models, etc. that facilitate characterization and down-selection of platform molecules with desirable characteristics**
 - ⇒ **Continued work on separations technologies is especially critical for development and scale-up of novel molecules and products**
 - ⇒ **Exploit specific advantages of products from oxygenated molecules (e.g., biodegradability, cross-link capability)**
 - ⇒ **Continue to fund research on lignin-derived polymers and natural fibers**
 - ⇒ **Bridge the readiness assessment gap between academics/research vs. industry where products and markets and profitability drive commercial deployment (e.g., scalability, quality control, certifications, risk)**
-

Biobased functional replacement plastics (PEF, PBS, etc.) currently don't have sufficient market-pull to drive investment. Performance-advantaged biobased plastics are a hard sell with consumers, investors, and brand owners without extensive education and effective communication of the value proposition.

3

Market Pull
Opportunity

- ⇒ **Multi-agency RFI targeting brand owners to identify critical performance needs**
 - ⇒ **Build upon IUCRC model to stimulate growth and investment**
 - ⇒ **Support promotion and expanded adoption of USDA's BioPreferred Program by engaging States, local governments, universities, other institutions**
 - ⇒ **Develop and promote better and more consistent understanding of key value propositions (e.g., biodegradability, sustainability, LCA, regional closed loop systems) to connect research to industry to brands to consumers to product end-of-life sustainability**
-

XI. Closing Comments

The meeting was adjourned.

Appendix A: Committee Member Attendance—Aug. 22–23, 2018

Co-Chairs	Affiliation	Attended?
Kelly Tiller	Genera Energy, Inc.	Yes
Douglas Faulkner	Leatherstocking, LLC	Yes

Members	Affiliation	Attended?
Charles Abbas	Archer Daniels Midland	Yes
Brent Bean	United Sorghum Checkoff Program	Yes
Michael Beardsley	Office of the Governor, Maine	Yes
Esteban Chornet	Enerkem	No
Katrina Cornish	Ohio State University	Yes
Steve Csonka	Commercial Aviation Alternative Fuels Initiative	Yes
Vonnie Estes	Estes Consulting	No
William Frey	Georgia-Pacific	Yes
Aviva Glaser	National Wildlife Federation	No
Emily Heaton	Iowa State University	Yes
Beth Hood	Arkansas State University	No
Raymond Huhnke	Oklahoma State University	Yes
Randy Jennings	Tennessee Department of Agriculture	Yes
Alan Keller	POET	Yes
Man Kit Lau	BioAmber Inc.	Yes
Pete Madden	Drax Biomass	Yes
Michael McAdams	Advanced Biofuels Association	No
Christine McKiernan	BIOFerm Energy Systems	No
Shelie Miller	University of Michigan	No
Ray Miller	Michigan State University	Yes
Manuel Garcia Pérez	Washington State University	Yes
Tim Rials	University of Tennessee-Knoxville	Yes
Matthew Rudolf	SCS Global Services	No
Susan Rupp	Enviroscapes Ecological Consulting, LLC	Yes
Basudeb Saha	University of Delaware	Yes
Patricia Scanlan	Scanlan Environmental LLC	Yes
Don Stevens	Cascade Science and Tech. Research	Yes
Larry Sullivan	The Citadel	Yes
Valerie Thomas	Georgia Tech	Yes
Michael Wolcott	Washington State University	No

Total: 24 of 32 members attended

Appendix B: Agenda—Aug. 22-23, 2017

DAY 1	Technical Advisory Committee Meeting		August 22, 2018
7:30 – 8:00 am		Swearing-In of New Members and Ethics Training	<i>Morgan McKnight Melinda Comfort</i>
8:00 – 8:30 am	<i>Continental Breakfast***</i>		
8:30 – 8:50 am	Welcome*		<i>Co-Chairs</i>
	Introductions	Introduction of New Members	
	Report	2017 Biomass R&D Initiative (BRDI) Board Presentation & Feedback	
	Presentation*	Introduction of Quarterly Discussion Topic	
8:50 – 9:00 am	Presentation*	Committee Business & U.S. DOE Updates	<i>Mark Elless, DFO US DOE</i>
9:00 – 9:20 am	Presentation*	USDA Biomass R&D Activities and Bioeconomy Initiative Update BRDI Solicitation, Status & Update	<i>Daniel Cassidy, USDA</i>
9:20 – 9:30 am	<i>Coffee Break</i>		
9:30 – 10:30 am	Panel 1*	Biomass R&D Interagency Working Group Updates <ul style="list-style-type: none"> - Algae - Feedstocks: Genetic Improvement - Feedstocks: Production & Mgmt - Feedstocks: Logistics - Conversion - Analysis - Sustainability - Transportation, Distribution, and End-Use 	<i>Kristen Johnson, US DOE</i>
10:30 – 11:15 am	Presentation*	Overview of Summit on Realizing the Circular Carbon Economy: Charting a Course for Innovations in Agriculture and Energy, with a Focus on Biobased Plastics	<i>David Babson, USDA on detail from US DOE</i>
11:15 – 11:30 am	<i>Public Comment*</i>		
11:30 – 12:15 pm	<i>Lunch***</i>		<i>DOE Rep</i>

		<i>Mark Menezes, US DOE Under Secretary of Energy</i>	
12:15 – 1:15 pm	Presentation*	Opportunities and Challenges for Biobased Plastics R&D	<i>Mary Bidy, NREL Patrick Krieger, Plastics Industry Assn</i>
1:15 – 1:30 pm	Discussion*	Subcommittee Instructions	<i>Co-Chairs</i>
1:30 – 4:00 pm	Breakout **	Subcommittee Breakouts (<i>Coffee Break as needed</i>)	<i>Subcommittees</i>
4:00 – 5:30 pm	Discussion*	Subcommittee Day One Reports	<i>Full Committee</i>

DAY 2	Technical Advisory Committee Meeting	August 23, 2018
--------------	---	------------------------

7:30 – 8:00 am	<i>Continental Breakfast***</i>		
8:00 – 8:30 am	Discussion*	Subcommittee Instructions (including Draft Report, TAC Website Review, & 2018/19 TAC Quarterly Focus Topics)	<i>Co-Chairs</i>
8:30 – 10:30 am	Breakout **	Subcommittee Breakouts	<i>Subcommittees</i>
10:30 – 10:45 am	<i>Coffee Break</i>		
10:45 – 12:15 pm	Presentation*	Subcommittee Breakout Reports, Committee Discussion, and Recommendations	<i>Full Committee</i>
12:15 – 12:30 pm	<i>Public Comment*</i>		
12:30 – 1:30 pm	<i>Lunch***</i>		
1:30 pm	<i>Adjourn</i>		

* *Full Committee Meetings, Presentations, and Public Comment Hearings are open to the public.*
 ** *Subcommittee Meetings are closed to the public.*
 *** *Meals and Break Service are closed to the public and provided for Committee Members only.*